How to Access Image Service Functions in ArcGIS for Desktop

This tutorial will show you how to access raster functions from the LiDAR Image Services located at: http://lidar.geodata.md.gov/imap/rest/services, using ArcGIS for Desktop and ArcGIS Online.

What are Raster Functions?
ArcGIS 10 brought new functionality to our rasters, allowing on-the-fly processing to be applied to datasets without altering the original data. These functions can be chained together and ultimately published with an Image Service for implementation on ArcGIS for Server.

What Raster Functions are Available?
The base product (*DEM_m) Image Services have been published with raster functions, providing the user with access to multiple derivative products nested within a single service.

The following functions are included:
Aspect, Slope, Hillshade, Multi-directional Hillshade, and DEM in feet.
These functions are accessible in ArcGIS for Desktop and ArcGIS Online.
First we will need to connect to the MD iMAP Maryland LiDAR Topography Server, for more information please follow this link to learn How to Access Maryland LiDAR Image Services.

Apply Raster Functions in ArcGIS for Desktop

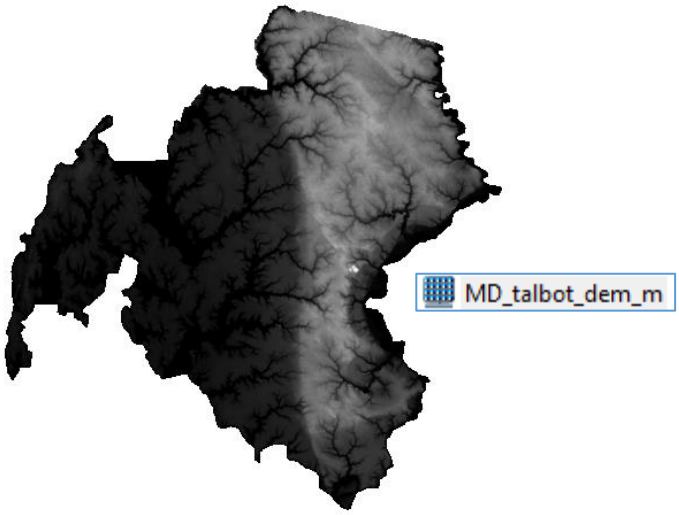
Quick Tips: Symbolizing Image Services with Raster Functions

Access Raster Functions in ArcGIS Online

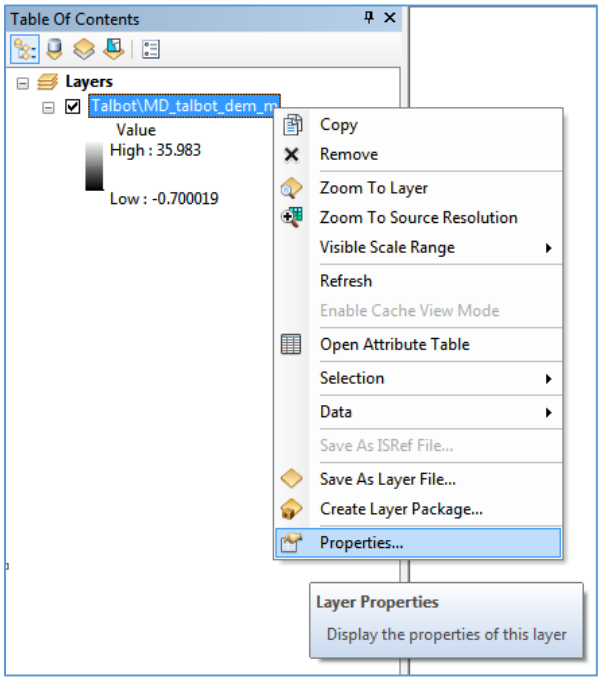
Apply Raster Functions in ArcGIS for Desktop

1. Open ArcMap.

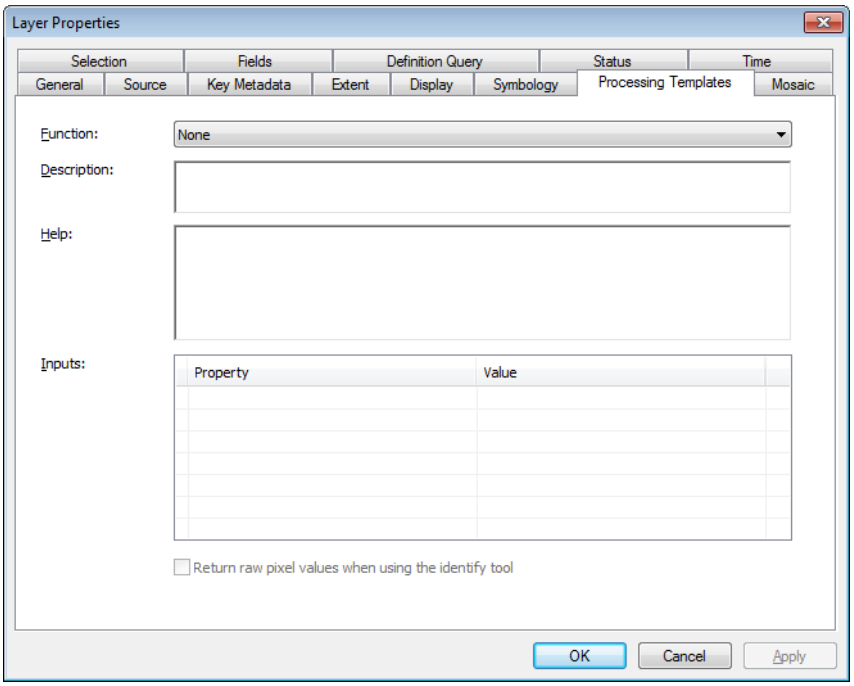
2. Add the desired Image Service to your map.
   For more information on accessing Maryland LiDAR image services, please read How to Access Maryland LiDAR Image Services.
   Note: Raster functions are only available for the [DEM_M] services within each county folder.



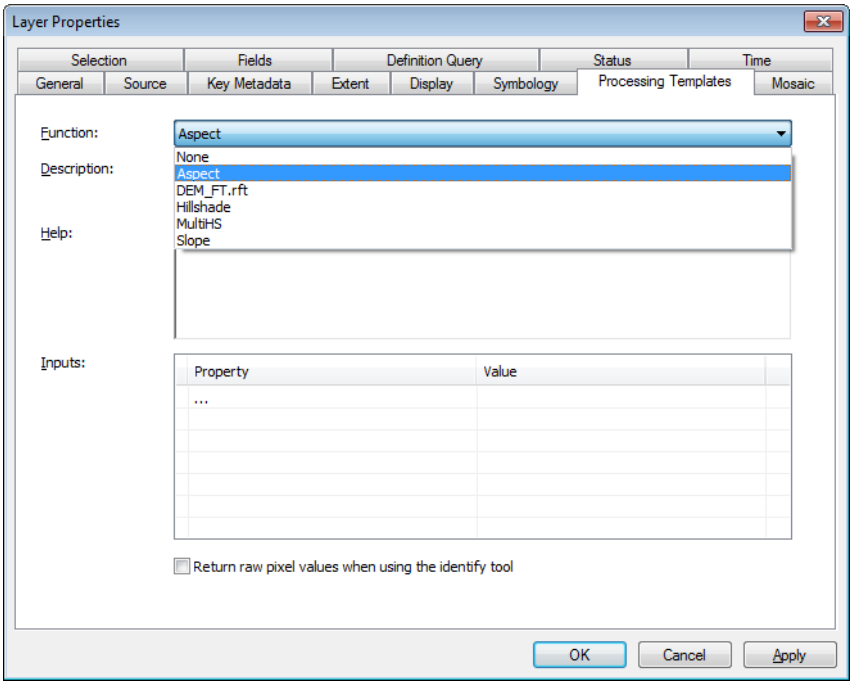
3. Right click the service layer in the ArcMap TOC (Table of Contents) > Open layer properties.



4. Navigate to and select the [Processing Templates] tab. If you are using ArcGIS for Desktop version 10.2.2 or earlier, the tab will be called [Server Functions].

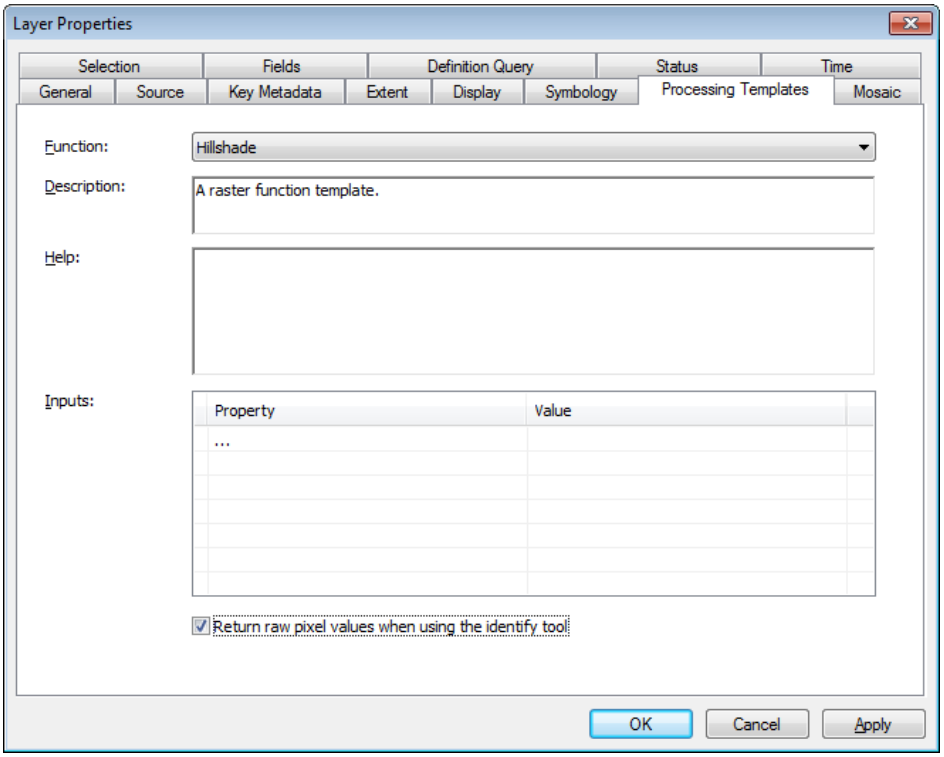


5. Using the [Functions] dropdown, you may select from the list of available raster functions: Aspect, DEM in feet, Hillshade, Multi-directional Hillshade, and Slope.



6. Select “Hillshade” from the [Functions] dropdown list.

7. Check the box at the bottom of the page:
   “Return raw pixel values when using the identify tool”.
   > Click [OK]



Note: This check box ensures that the elevation value (in meters) is returned, regardless of the applied raster function, when using the Identify Tool in ArcMap.
Leaving this box unchecked will return, when indentified, the derived value from the applied raster function.

ie: Identifying the service while the Slope function is applied will return slope percentage values if this checkbox was not marked. Marking the check box will return the elevation values in meters.

8. The Quick Tips on the following page will show how to properly symbolize the Image Service based on the applied function.

Quick Tips: Symbolizing Image Services with Raster Functions

1. After applying a raster function to the Image Service, the original service symbology may still display. Setting a new symbology may be required to properly display the function.

   Use the Quick Links below to navigate to the appropriate section based on the applied function:

   Symbology Settings for Slope Function

   Symbology Settings for Aspect Function

   Symbology Settings for Hillshade Function

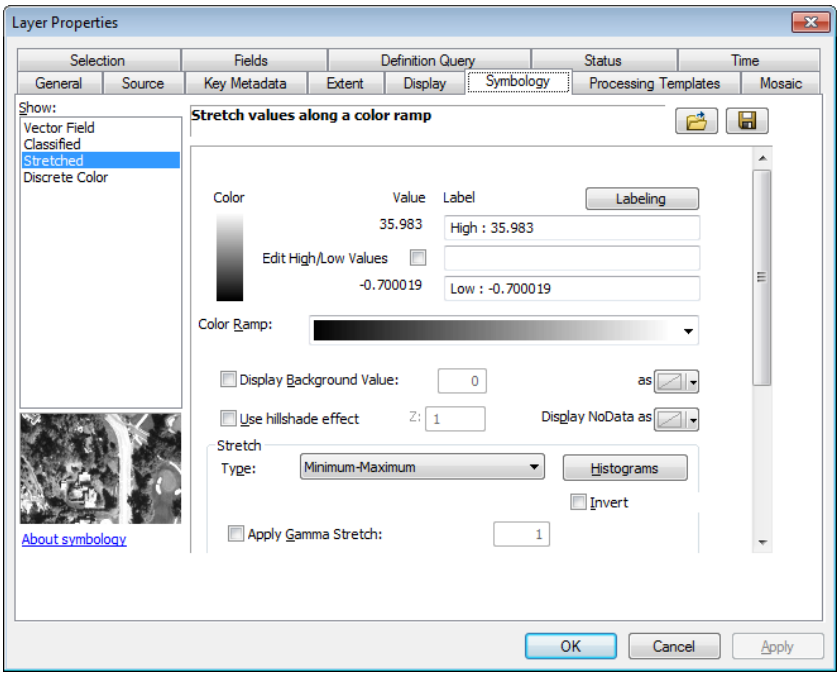
   Symbology Settings for Multi-Directional Hillshade Function

   Symbology Settings for DEM (feet) Function

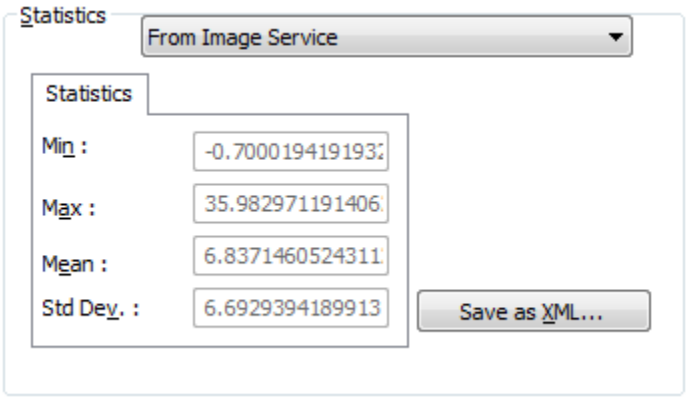
Symbology Settings for Slope Function

1. Once you have applied the slope function to your Image Service, you will need to optimize the symbology settings to appropriately represent the surface.
   >Open Layer Properties

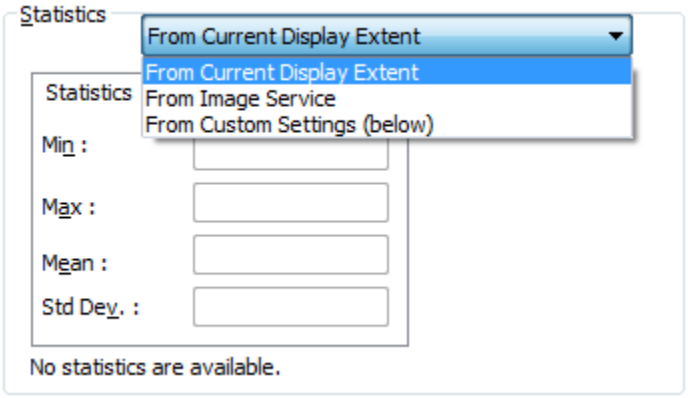
2. Navigate to and select the [Symbology] tab.



3. Scroll to the bottom of the [Symbology] window to the “Statistics” section

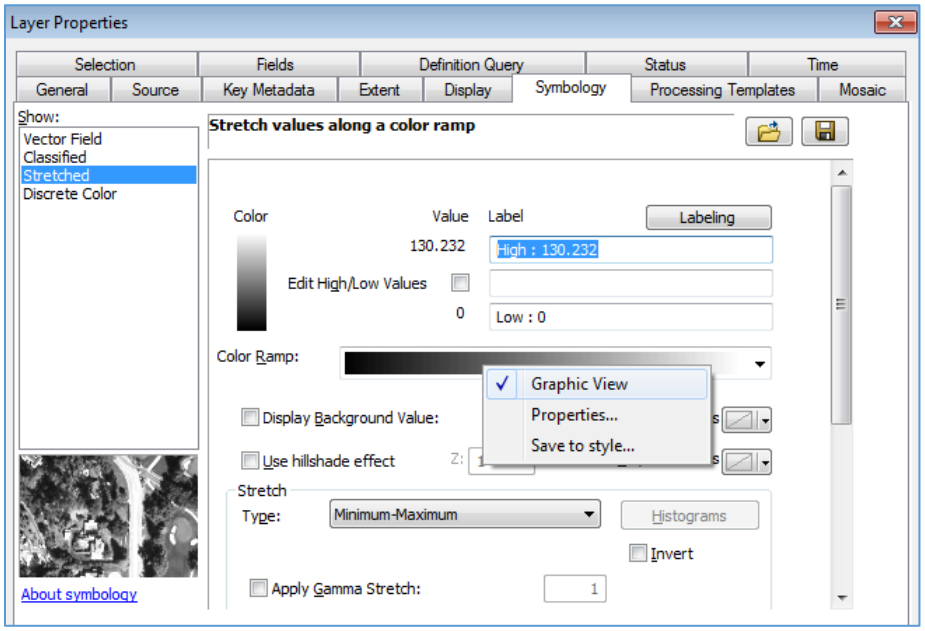


4. Change the settings, “From Image Service” to “From Current Display Extent”
   > Click [Apply]



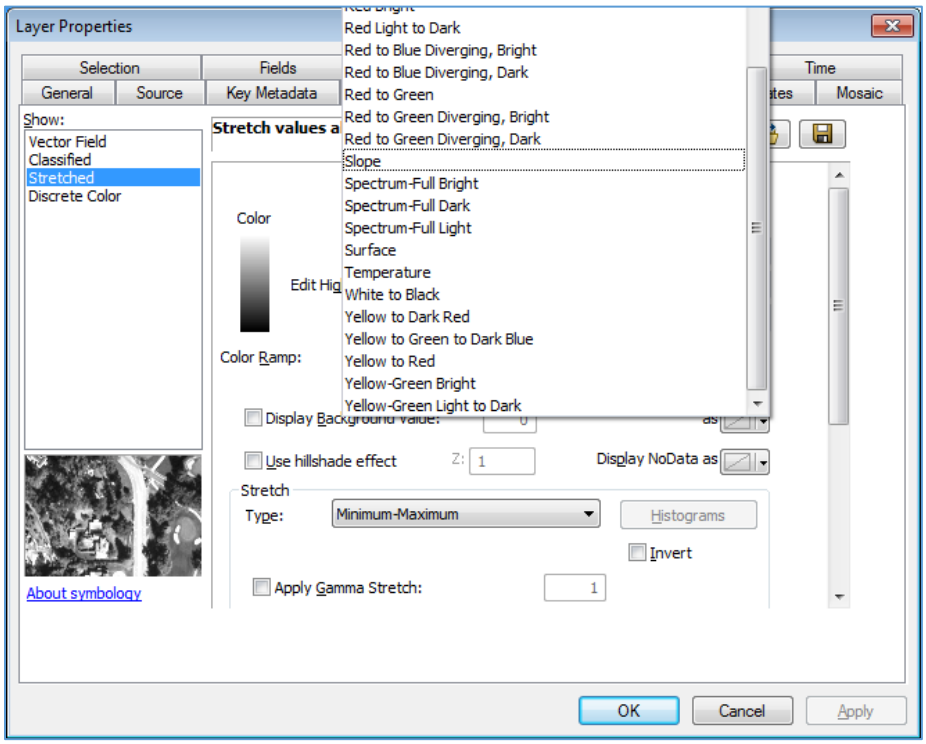
Note: This setting allows the Image Service to render based on the statistics of the current extent displayed. As you zoom/pan the map area, the symbology statistics will update and the rendering will update appropriately.
In particular with the Slope function applied, the values need to change drastically between zoom levels.
The data values are not affected by symbolization settings.

5. Scroll to the top of the [Symbology] tab.
   Right click the color ramp dropdown and uncheck the selection for “Graphic View”



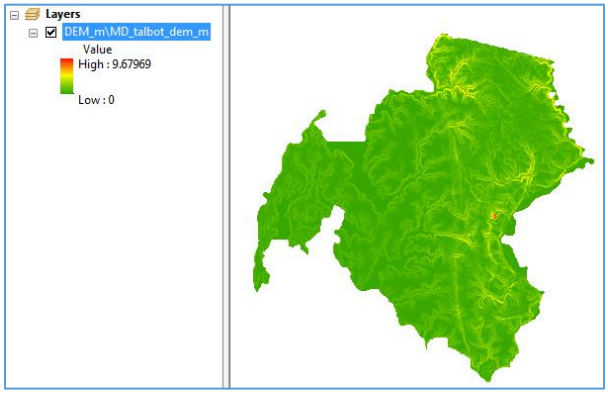
Note: This enables the “Text” view for the color ramp dropdown

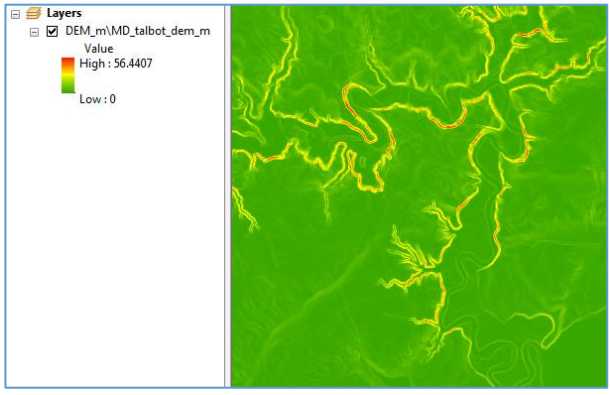
6. Locate and select the “Slope” color ramp from the dropdown menu.



7. Click [OK] to finalize your symbology settings.

8. Zoom and pan the map to see how statistics are recalculated for each new extent.

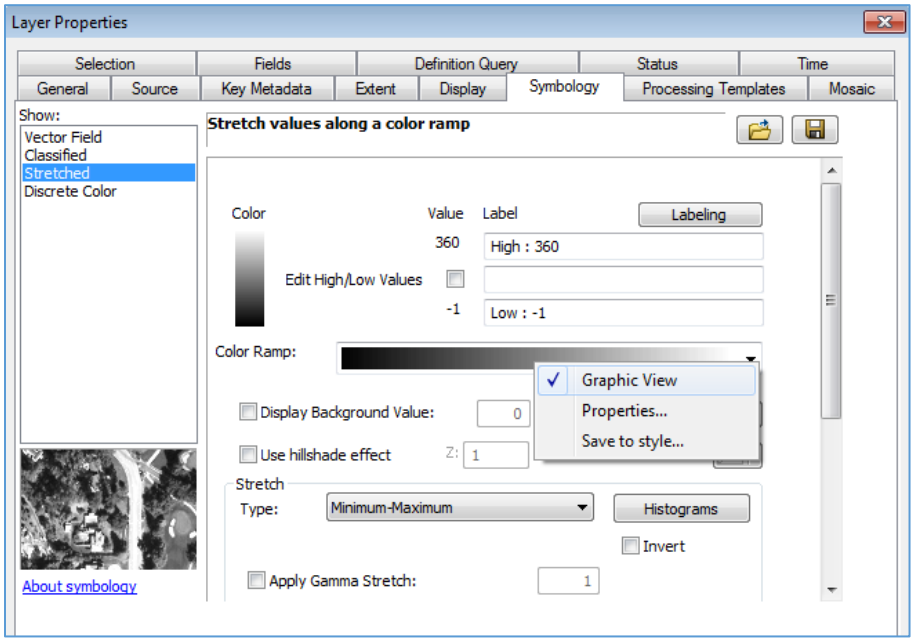




Symbology Settings for Aspect Function

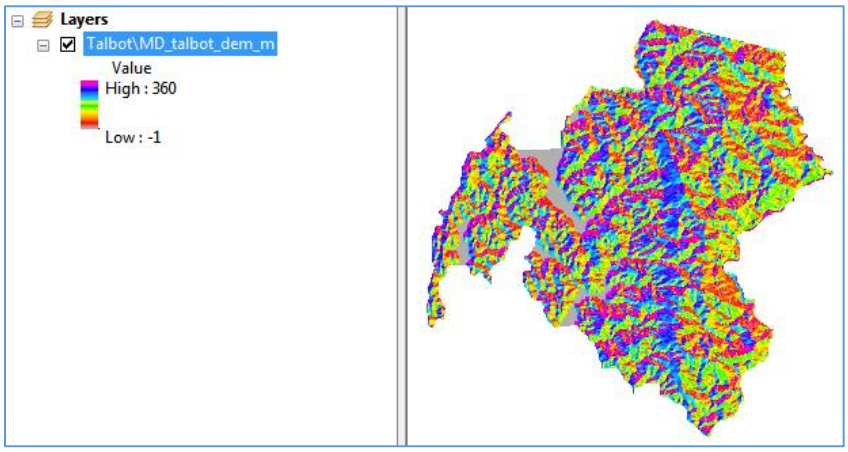
1. Once you have applied the aspect function to your Image Service, the statistics for your Image Service should automatically update to minimum (-1), maximum (360).
   To change the color ramp appropriately,
   >Open Layer Properties and select the [Symbology] tab.

2. Right click the color ramp dropdown and uncheck the selection for “Graphic View”.



Note: This enables the “Text” view for the color ramp dropdown

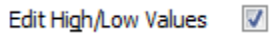
3. Select “Aspect” from the dropdown list and click [OK].



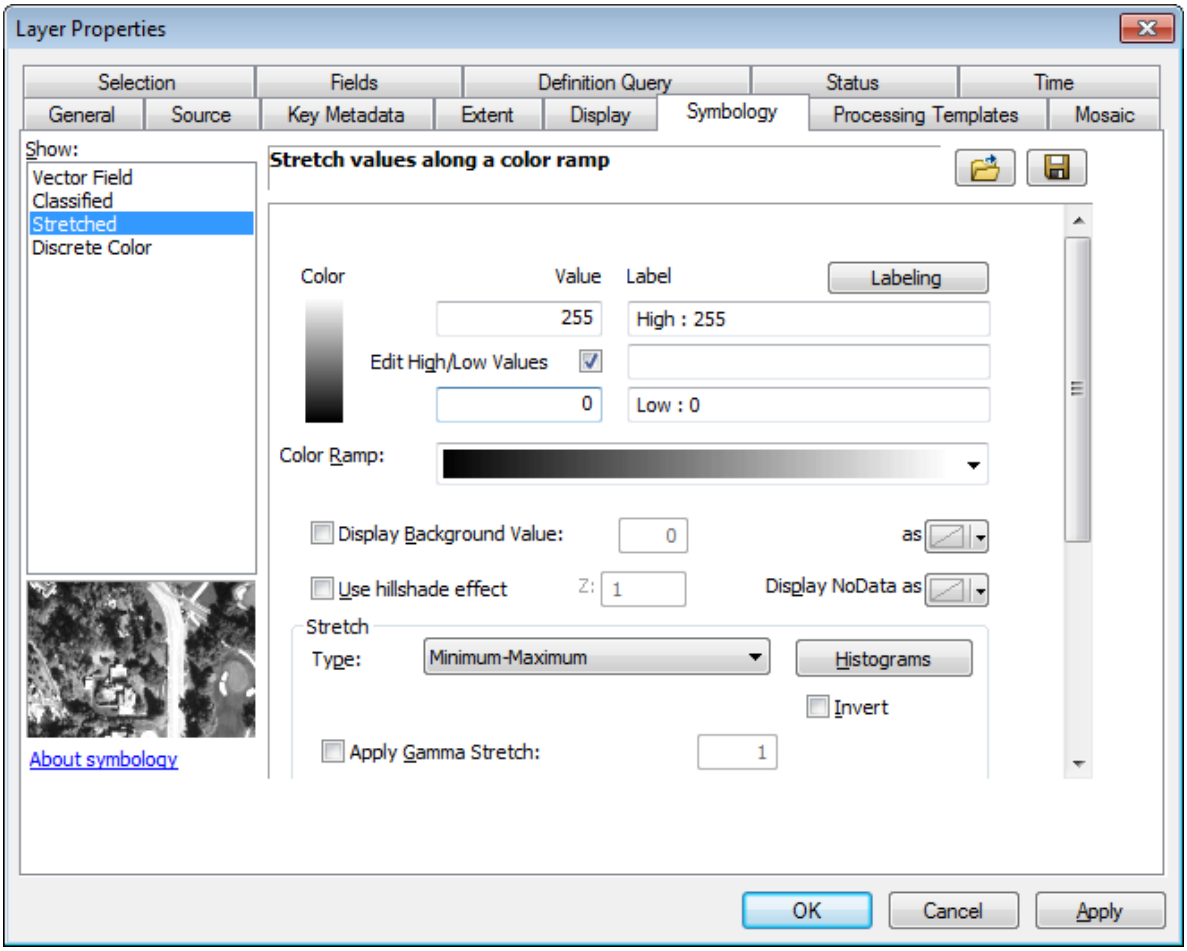
Symbology Settings for Hillshade Function

1. After you have applied the Hillshade function to your Image Service, the symbology may need to be updated to render the service appropriately.
   The statistics will remain from the original DEM and likely will not accurately represent the hillshade value range (0-255).
   >Open Layer Properties and select the [Symbology] tab.

2. Check the box for “Edit High/Low Values”



3. Set the high value [255]
   Set the low value [0]

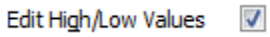


Click [OK]

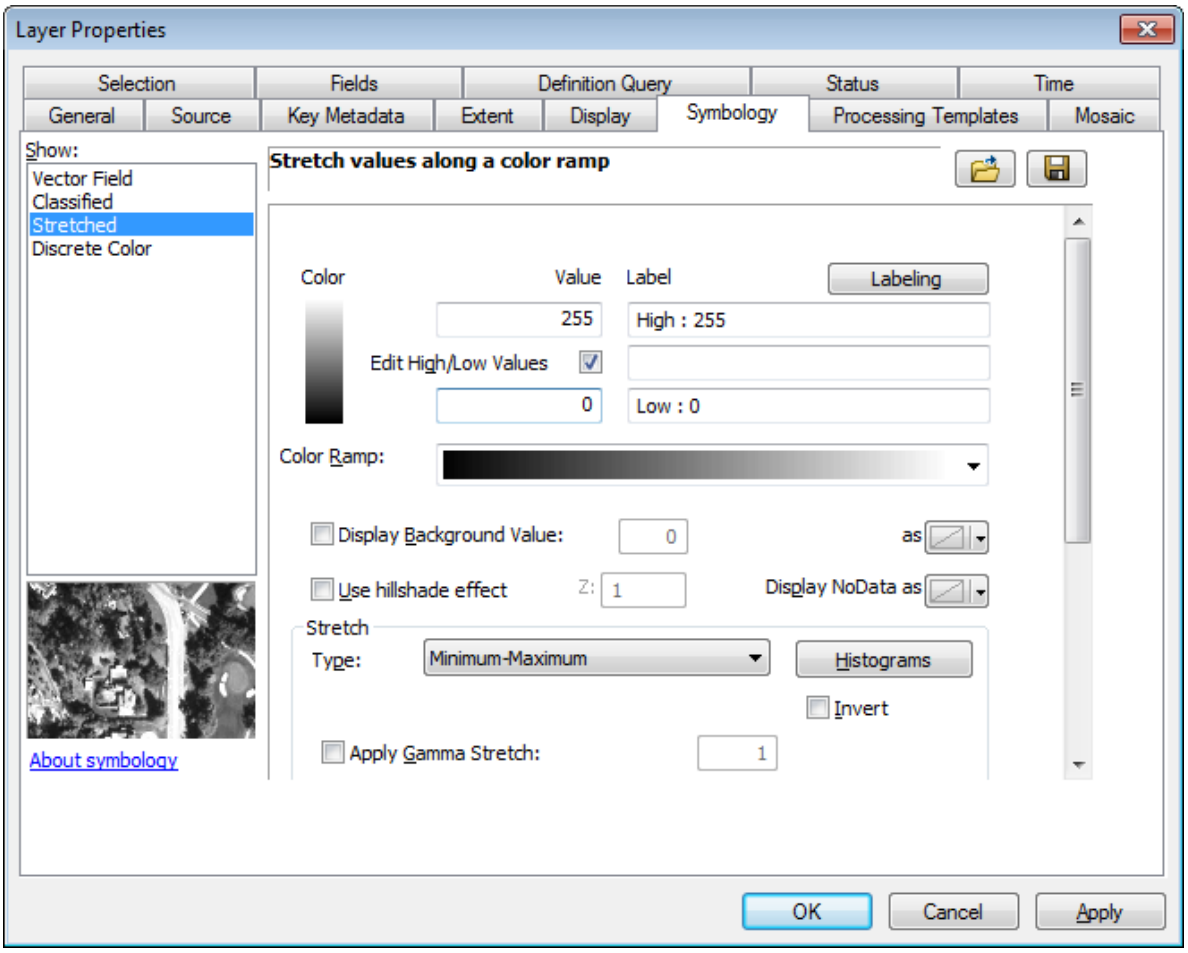
Symbology Settings for Multi-Directional Hillshade Function

1. *Note: This function only works with ArcGIS version 10.3.1 and later.*
   After you have applied the Multi-Directional Hillshade function to your Image Service, the symbology may need to be updated to render the service appropriately.
   The statistics will remain from the original DEM and likely will not accurately represent the hillshade value range (0-255).
   >Open Layer Properties and select the [Symbology] tab.

2. Check the box for “Edit High/Low Values”



   Set the high value [255]
   Set the low value [0]

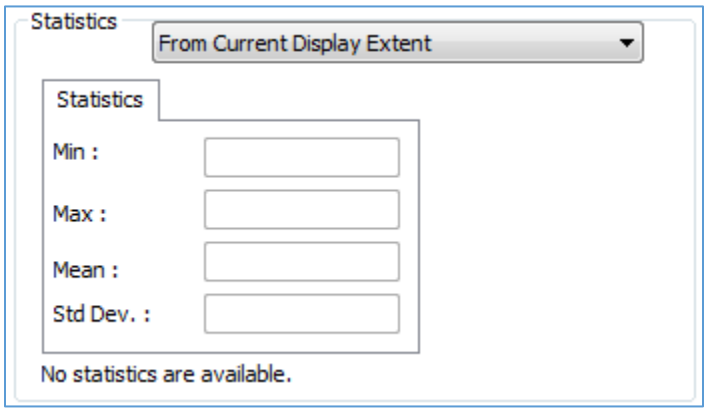


   Click [OK]

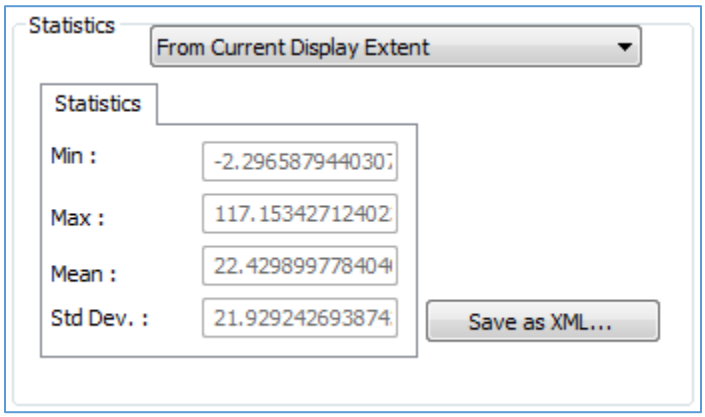
Symbology Settings for DEM (feet) Function

1. Converting the Image Service DEM from meters to feet does not update the symbology automatically. In order to render the new function appropriately, the layer's symbology will need to be updated.
   >Open Layer Properties and select the [Symbology] tab.

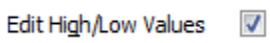
2. Scroll to the bottom of the properties window (Symbology tab) and select "From Current Display Extent" from the Statistics dropdown.



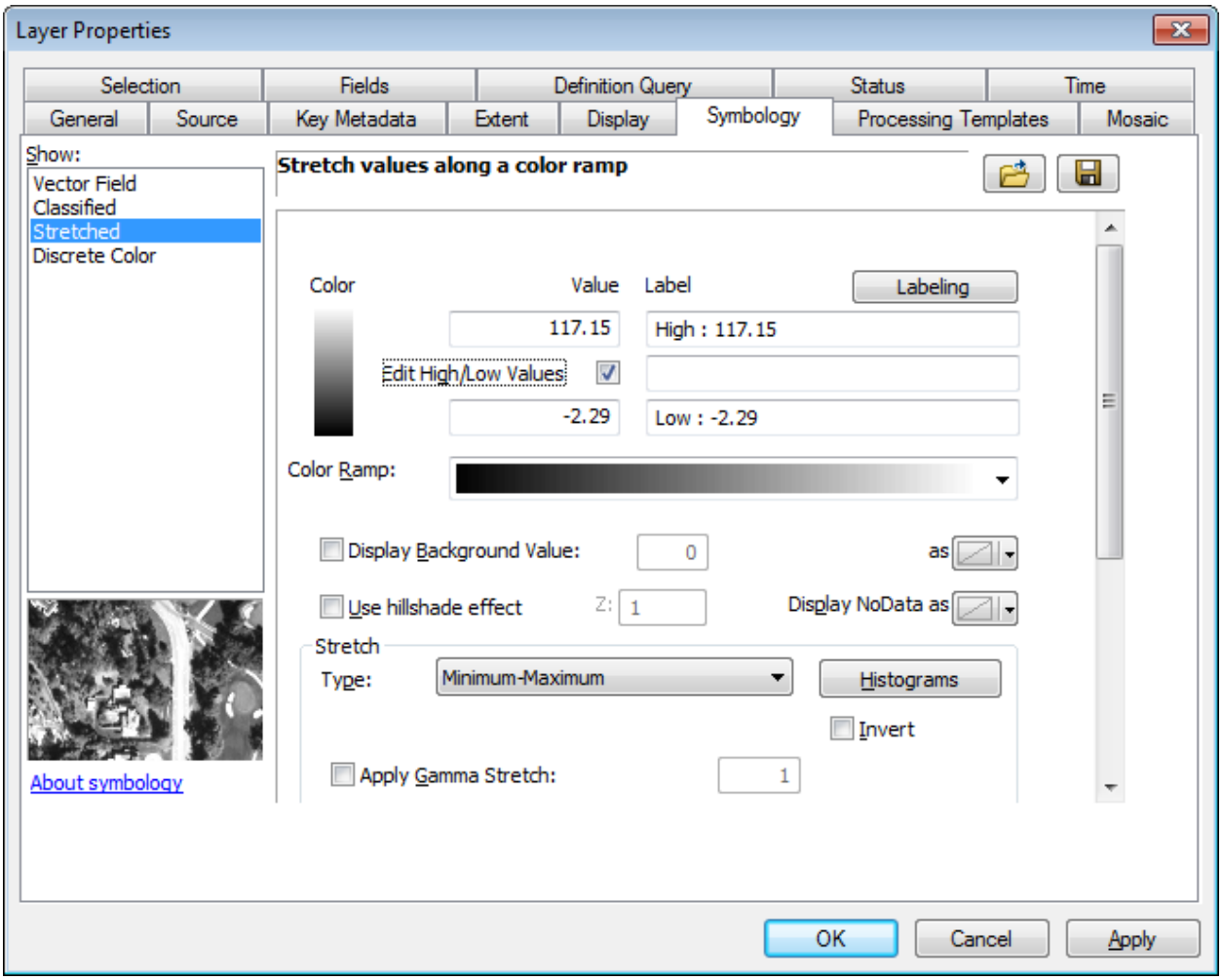
3. Click [Apply] to calculate and populate statistics.



4. Scroll back to the top of the properties window (Symbology tab).
   Check the box for "Edit High/Low Values"



5. Set the high value to match the “Max” statistic.
   Set the low value to match the “Min” statistic.

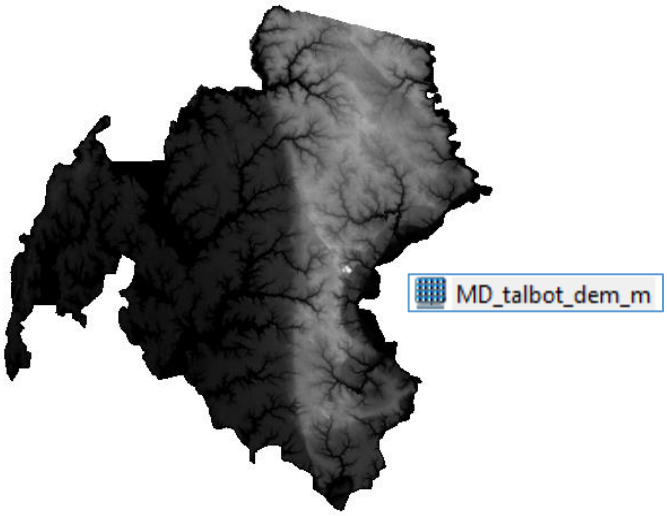


Click [OK]

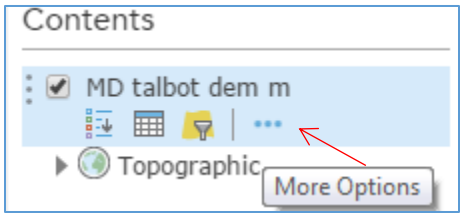
Access Raster Functions in ArcGIS Online

1. Open ArcGIS Online map.

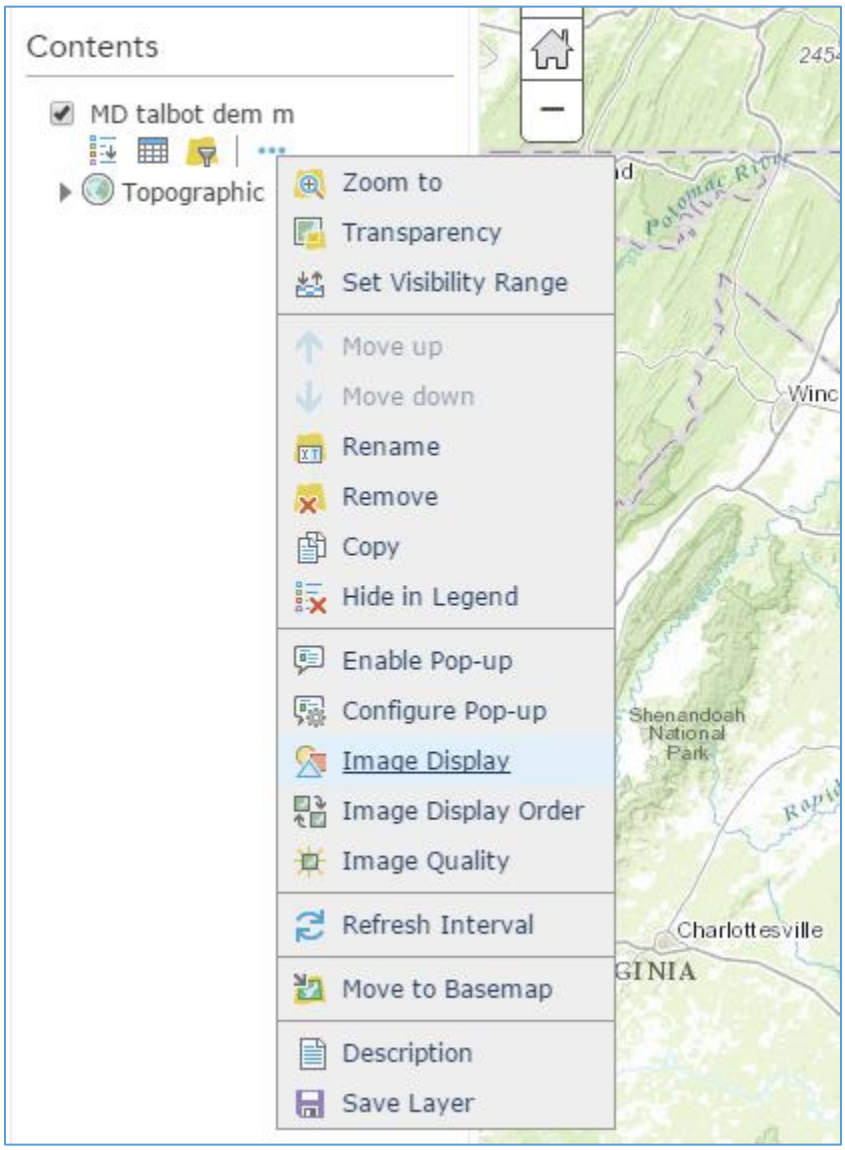
2. Add the desired Image Service to your map. See How to Access Maryland LiDAR Image Services.
   Note: Raster functions are only available for the [DEM_M] services within each county folder.



3. After the layer is added to your map; navigate to the contents section of the map. Open "More Options" dropdown menu:

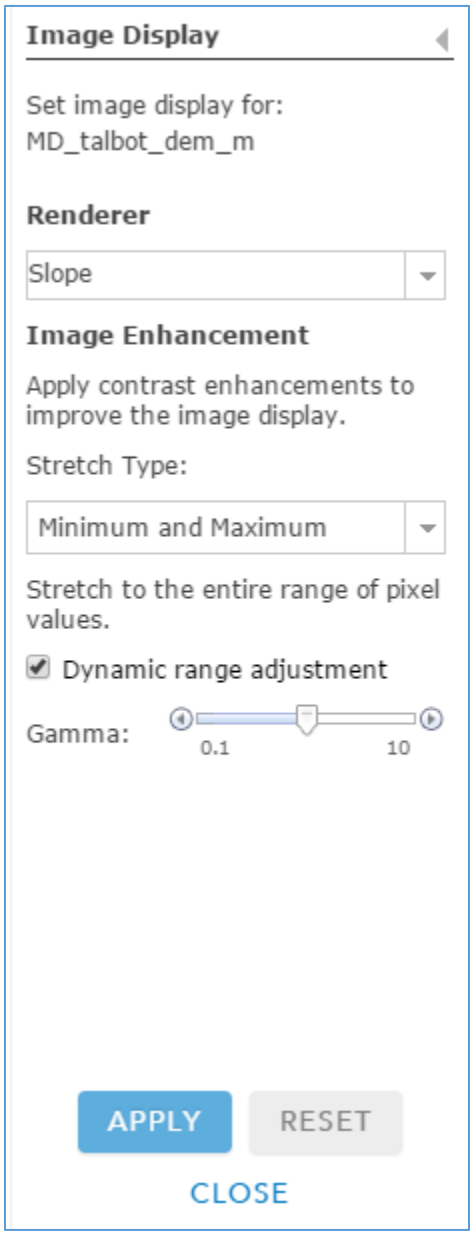


4. Open the “Image Display” menu item from the dropdown:



5. Select the raster function from the “Renderer” dropdown menu.
   Image display can be enhanced with the “Image Enhancement” section of the “Image Display”.
   Set the “Stretch Type” to Min/ Max to allow for Dynamic Range Adjustment (DRA) to be set.

Example: Set renderer to Slope; set stretch to Min/Max and check the box for DRA: Click [Apply]



Click [Close] to return to your AGOL map.

ADDITIONAL RESOURCES

For more information about Maryland LiDAR, please visit the Maryland LiDAR Overview page

For more information about additional training opportunities, please visit the MD iMAP Training Overview page, or contact Lisa Lowe, Senior GIS Analyst with the Maryland Department of Information Technology, Geographic Information Office at lisa.lowe@maryland.gov.

For additional MD iMAP datasets, please visit the GIS Data Catalog

For all other inquiries related to Maryland LiDAR, please contact the GIO Office at service.desk@maryland.gov.